

THE LARVA OF *LEPTANILLA JAPONICA*,
WITH NOTES ON THE GENUS
(HYMENOPTERA: FORMICIDAE: LEPTANILLINAE)

BY GEORGE C. WHEELER AND JEANETTE WHEELER*

Research Associates Florida Department of Agriculture

We have previously described (1965) the larvae of three species of *Leptanilla*: *revelierei* Emery, *swani* Wheeler and *esheri* (Kutter). Now, thanks to the generosity of Dr. Keiichi Masuko, we are able to describe the fourth. We do not ordinarily describe and illustrate fully the larva of more than one species of a genus, but *Leptanilla* larvae are so extraordinary that we consider it advisable to describe as many species as possible. Perhaps by so doing we can convince skeptics (including us) that such creatures actually exist.

Dr. Masuko has not only provided us with specimens but also with his manuscripts, from which we quote briefly (with his permission). Dr. Masuko is the only myrmecologist who has seen living *Leptanilla* larvae. Furthermore, his observations necessitate changes in our previous descriptions. Hence we will begin with a complete revision of our generic characterization, which is also a characterization of the subfamily.

Genus *LEPTANILLA* Emery

Elongate and very slender; slightly constricted at the metathorax; remainder of body straight and clavate. With a curious structure projecting anteroventrally from the ventral surface of the prothorax. Spiracles minute. A hemolymph feeding pore on each side of abdominal somite III or IV. Body hairs smooth and unbranched, minute hairs very abundant and uniformly distributed; a few long hairs sparsely scattered. Cranium thin; subpyriform in anterior view, at least a third longer than broad. Head hairs lacking. Antennae small; each on the ventral end of a narrow ridge; each with 2 sensilla. Labrum large and thin; posterior surface spinulose; lateral surfaces with a few long slender sharp-pointed teeth. Mandible

*Mailing Address: George C. Wheeler and Jeanette Wheeler, 3358 NE 58th Avenue, Silver Springs, Florida 32688.

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turned laterally (instead of medially as is usual with ant larvae); feebly sclerotized; with a long slender sharp-pointed apical tooth, which curves laterally; outer border furnished with several long slender sharp-pointed teeth; anterior surface with spinules in rows. Labium thin, flap-like and narrowed basally; each palp a ventro-lateral cluster of five sensilla.

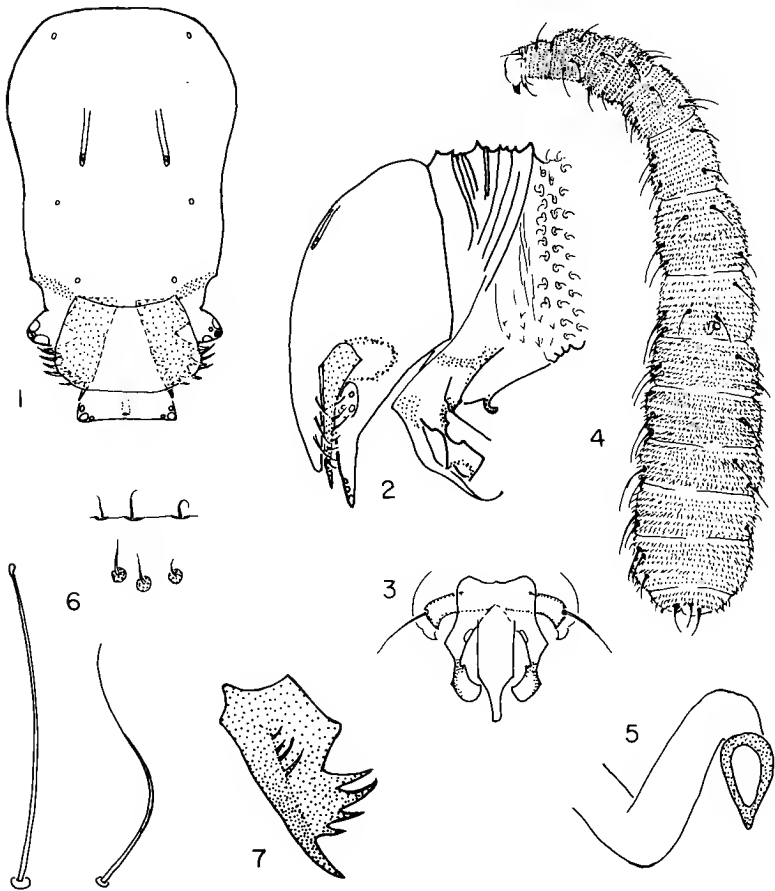
The larvae of *Leptanilla* are unique among the 200 known genera of ant larvae in 3 characters: The prothoracic projection, the hemolymph feeding pores and the mandibles. The most significant of the 3 is the hemolymph feeding pores. We considered them to be spiracles, because we could not find any structures that resembled spiracles. One reason why is now apparent: the spiracles of *L. japonica* are of the same diameter as the base of a minute hair. Therefore even if we had seen a spiracle we would have considered it as the base of a broken-off hair. Another reason: no one had ever studied a live colony of *Leptanilla*. The solution of the problem is Masuko's discovery of "larval hemolymph feeding (LHF)":—

Whenever the queen froze at the 4th abdominal segment, her mouthparts were placed near the posterior border on a side. "In this region a pair of strange structures is present. [Each] is externally a naked circular area bordered by a fringe of stiff hairs. . . . In the center of this area, a slit-like opening is located. . . . Histological sections were made [of] this region, revealing that this opening is internally attached to a short duct. . . . This duct is strongly bent and opens directly into the larval body cavity."

"Since oral trophallaxis is totally absent in the species, LHF is the only way of obtaining nutrients by the queens. [The queens never feed on prey.] . . . *L. japonica* workers ordinarily performed LHF even close to the queens, in addition to the prey feeding."

Leptanilla japonica Baroni-Urbani

Length (through spiracles) 1.2–1.7 mm. Elongate and very slender; slightly constricted at the metathorax; remainder of body straight and clavate. Anus posterior. With a peculiar complex structure on the anteroventral surface of the prothorax. Spiracles minute (sometimes vestigial or absent) on T2, T3 and A1–AVIII. On AIV there is a pair of "hemolymph feeding pores" (Masuko, in preparation). Integument of naked anterior portion of T1 with ridges and spinules; posterior portion with hairs similar to those on remainder



Figs. 1-7. Larva of *Leptanilla japonica*. 1, Head in anterior view, $\times 508$; 2, head in side view, $\times 397$; 3, prothoracic projection in anterior view, $\times 397$; 4, larva in side view, $\times 59$; 5, left hemolymph feeding pore, $\times 1042$; 6, three types of body hairs, $\times 508$; 7, left mandible in anterior view, $\times 962$.

of body. Body hairs unbranched, smooth and slightly curved. Of 3 types: (1) 0.003-0.006 mm long, numerous, uniformly distributed (except lacking on anterior portion of T1 and posterior portion of AX) and in transverse rows, each hair set in a slightly sclerotized shallow depression; (2) 0.019-0.088 mm long, with pointed tip, a few

on each somite; (3) 0.069–0.088 mm long, with slightly enlarged flattened tip, on ventrolateral surfaces of A1–AVIII. Cranium thin; subpyriform in anterior view; a third longer than broad. Antenna minute; with 2 sensilla at end of a long ridge. No head hairs. Labrum a large thin flap, a third broader than long, widest ventrally; with 4 long slender sharp-pointed teeth on each lateral surface. Mandible turned laterally; apical half of medial surface heavily sclerotized; ending in a sharp-pointed apical tooth; anterior surface bearing about 4 long slender sharp-pointed teeth; with a wide blade bearing 4 long slender sharp-pointed teeth directed laterally. Maxilla (only partly visible) with a short base and a large lobate palp bearing 5 (1 apical and 4 subapical) sensilla; galea not seen. Labium a very thin flap, trapezoidal in anterior view, narrowed dorsally; palp represented by 5 sensilla on each ventrolateral corner; opening of sericteries a narrow slit on the ventral surface. (Material studied; 5 larvae from Kanagawa Pref., Japan, courtesy of Keiichi Masuko.)

APOLOGIA

Of the 800 species of ant larvae we have studied, the leptanilline larvae are undoubtedly the most difficult to process. They are minute: 1.2–1.7 mm long. They are very slender; they must be punctured in several places with a minute needle; these minute openings retard the transfer of the processing liquids. If KOH does completely dissolve the internal tissues, the insoluble residue cannot be forced out without damaging the larval integument. Even when an integument is entirely cleaned the stain may never reach the head. After a stained integument is on a slide in balsam, it must be moved into the desired position for drawing. If the consistency of the balsam is not exactly right, the delicate integument will tear.

Another difficulty: we have had so few specimens (3, 3 and 5) that we dared not experiment.

Once a larva was stained and stably mounted we encountered difficulties of interpretation. The most exasperating was determining the limits of the prothorax (of this we were never certain). No orthodox insect larva or adult should have spiracles on the prothorax. But some insects do: the mesothoracic spiracles migrate forward during development. But the spiracles of *Leptanilla* are difficult to find because of their minute size. Furthermore Masuko has found by SEM photography that spiracles may be vestigial or

lacking on some somites of some larvae.

Even if one does determine the extent of the prothorax and does locate the 4th abdominal somite, he still has to find the hemolymph feeding pores. That is easy in *revelierei* because of the heavily sclerotized rim. This rim is lacking in *swani* and *japonica*. In fact, in the latter two we are unable to locate the pores in our preserved specimens.

SUMMARY

The larva of *Leptanilla japonica* is described and illustrated. The structures on abdominal somite IV, which have heretofore been regarded as the only spiracles, have been shown by Masuko to be hemolymph feeding pores. The larvae of the genus are characterized on the basis of the four known species.

LITERATURE CITED

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